MINISTRY OF SUPPLY - DLRD/RRE

VALVE ELECTRONIC

CV4007

Specification MOS/CV 4007

Issue 3 Dated 21.9.56.

To be read in conjunction with K1001 and BS.448
Nearest Equivalent American Specification - MIL-E-1/235

SECURITY	
Specification	Valve
UNCLASSIFIED	UNCLASSIFIED

→ Indicates a change

TYPE OF VALVE - Reliable Double Diode

CATHODE - Indirectly-heated (Separate cathodes)

ENVELOPE - Glass

PROTOTYPE - CV283; VX7129

RETMA DESIGNATION - 5726/6AL5W/6097

MARKING

See K1001/4

Additional Marking

5726/6AL5W/6097

RATING

			Note
Heater Voltage	(V)	6.3	
Heater Current	(A)	0.3	
Max Peak Inverse Anode Voltage	(V)	360	
Max Peak Anode Current	(mA)	60	B
Max Mean Anode Current	(mA)	10	B
Max Surge Anode Current	(mA)	350	B
Max Heater-cathode Voltage	(V)	360	C
Max Bulb Temperature	(°C)	165	D
Max Shock (short duration)	(g)	500	
Max Acceleration (continuous operation)	(g)	2.5	

CAPACITANCES (pF)

Ca',a" (max)	0.026	E
Ca,(h+k+s) (nom)	3.2	B,E
Ck,(h+a+s) (nom)	3.9	B,E

BASE

B7G

See BS.448 : B7G/1.1

CONNECTIONS

Pin	Electrode	
1	Cathode	k'
2	Anode	a"
3	Heater	h
4	Heater	h
5	Cathode	k"
6	Internal Shield	s
7	Anode	a'

DIMENSIONS

See BS 448 : B 7G/2.1
Size Ref No 1.

Dimension(mm)	Min.	Max.
A. Seated height	-	38
C. Diameter	16	19
D. Overall length	-	45

MOUNTING POSITION

Any

NOTES

A. All limiting values are absolute.

B. Each diode

C. Breakdown value with cathode positive to heater.

D. Caution to Electronic Equipment Design Engineers: Special attention should be given to the temperature of valves to be operated in aircraft. Reliability will be seriously impaired if the maximum bulb temperature is exceeded. The life expectancy may be reduced if conditions other than those specified for life test are imposed on the valve and will be reduced appreciably if absolute maximum ratings are exceeded. Both reliability and performance will be jeopardised if heater voltage ratings are exceeded; life and reliability performance are directly related to the degree that regulation of the heater voltage is maintained at its centre-rated value.

E. Measured with a closely fitting metal can.

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TESTS

To be performed in addition to those applicable in K1001

Test shall be performed in the specified order unless otherwise agreed with the Inspecting Authority.

Test Conditions - unless otherwise specified

Vh (V)	Va (Vrms)	RL (ohms)	C (uF)
6.3	165	11,000	8.0

K1001	Test	Test Conditions	AQL %	Insp. Level	Sym-bol	Limits Min	LAL	Bogey	UAL	Max	ALD	Units
→ 7.1	Glass Strain	No voltages	6.5	I								
	GROUP A											
5.2	Insulation			100%	R							
		Va, all = -300V				100				-		M
		Vs, all = -300V				100				-		M
	GROUP B	Combined AQL	1.0									
	Heater Current		0.65	II	Ih	0.275		0.30		0.325		A
	Heater-cathode Leakage Current	Vhk = ±100V; Note 1	0.65	II	Ihk	-		-		5.0		uA
	Output Current	Note 2	0.65	II	I out	16		18		-		mA
	Emission (1)	Va = 10.0V; Note 1	0.65	II	Ia	40		-		-		mA
	GROUP C	Combined AQL	6.5									
	Emission (2)	Vh = 5.7V; Va = 7.0 V rms										
		Notes 1, 3	2.5	I	ΔIa	-				15		%
	Anode Current	Va = 0; RL = 40k; Note 1	2.5	I	Ia	2.0				20		uA
	Difference between sections	Va = 0; RL = 40k Note 1	2.5	I	Ia	-				5.0		uA
	Hum	Vh = 7.0V; Note 4	2.5	I	Va AC	-				10.0		mV rms
	GROUP D											
→ 7.2	Base Strain		6.5	IA								
→	Capacitance	Measured on a 1 Mc/s bridge with the valve mounted in a fully screened socket. With shield.	6.5	IC								
		Ca',a²				-	-	-	-	0.026	-	pF
		Ca',k'+h+s+				-						
		External Screen				2.4	-	-	-	4.0	-	pF
		Ca²,k²+h+s+				2.4	-	-	-	4.0	-	pF
		External screen										
		Ck',a'+h+s+								5.0		
		External Screen				2.5	-	-	-	~~4.7~~	-	pF
		Ck²,a²+h+s+								5.0		
		External Screen				2.5	-	-	-	~~4.7~~	-	pF
	GROUP E	Combined AQL	6.5									
→ 11.3	Fatigue	Vh = 6.3V switched 1 min on and 3 mins off; Va = 0; f = 170 c/s; Min pk accel = 5g;		IA								
→		Duration = 30, 39, 30 hrs.										
	Post Fatigue Tests											
	Heater-cathode Leakage Current	Vhk = ±100V; Note 1	2.5	Ihk	-					15		uA
	Output Current	Note 2	2.5	Iout	14					-		mA
11.4	Shock	No voltages		IA								
→		Hammer angle = 30°										
	Post Shock Tests											
	Heater-cathode Leakage Current	Vhk = ±100V; Note 1	2 5		Ihk	-				15		uA
	Output Current	Note 2	2.5		Iout	14				-		mA

TESTS (Cont'd)

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K1101	Test	Test Conditions	AQL	Insp. Level	Sym-bol	Limits Min	LAL	Bogey	UAL	Max	ALD	Units
	GROUP F											
AVI/5	Life	Note 2										
	Life Test End-point (500 hrs)	**Combined AQL**	6.5	IA								
AVI/ 5.6	Inoperatives		2.5									
	Heater Current		2.5		Ih	0.275				0.325		A
	Heater-cathode Leakage Current	Vhk = ±100V; Note 1	2.5		Ihk	-				10.0		uA
	Emission (1)	Va = 10.0V; Note 1	2.5		Ia	35				-		mA
	Anode Current	**Vg=0; Rl=40k; Note 1**	4.0		Ia	**1.0**				20		uA
	Insulation		4.0		R							
		Va, all = -300V				50				-		M
		Vs, all = -300V				50				-		M
	Emission (2)	Vh = 5.7V; Va = 7.0Vrms; Notes 1, 3	4.0		ΔIa	-				20		%
	Life Test End-point (1000 hrs.)	**Combined AQL**	10.0	IA								
AVI/ 5.6	Inoperatives		4.0									
	Heater Current		4.0		Ih	0.275				0.325		A
	Heater-cathode Leakage Current	Vhk = ±100V; Note 1	4.0		Ihk	-				10.0		uA
	Emission (1)	Va = 10.0V; Note 1	6.5		Ia	30				-		mA
	Insulation		6.5		R							
		Va, all = -300V				50				-		M
		Vs, all = -300V				50				-		M
	GROUP G											
AIX/ 2.5	Electrical re-test after 28-day holding period			100%								
AVI/ 5.6	Inoperatives		0.5									

NOTES

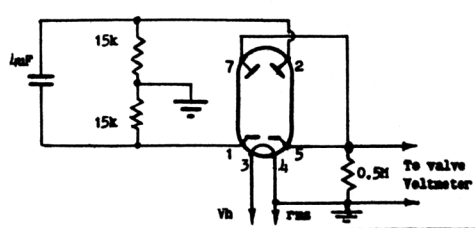
1. Test each section seperately.
2. **Measured in a dull wave circuit with the supply impedance (including transformer) initially adjusted so that a specially selected valve shall give an output of 18 mA. The selected valve shall be any valve in which the anode current is not less than 60 mA when 10 volts is applied. The anode voltage shall be measured between anode and earth by means of a rectifier type meter.**
3. The value of emission shall apply to individual valves and is expressed as

$$\frac{(Ia \text{ at } Vh = 6.3V) - (Ia \text{ at } Vh = 5.7V)}{(Ia \text{ at } Vh = 6.3V)} \times 100\%$$

   Readings at Vh = 6.3V and Vh = 5.7V shall be made with Va = 7.0V rms.
4. The valve shall be tested in the circuit shown in Fig. 1. Pin numbers are indicated for the electrode connections.
5. Breakdown voltage is defined as the voltage at which arcing occurs between anode base pin the adjacent pins. Other test conditions required shall be

   Va = 500V rms, 50 c/s sinusoidal waveform;
   Ambient pressure = 55 ± 5 mm mercury;
   Ambient temperature = 25 ± 5°C;
   Relative humidity = zero %

Fig. 1



Amendment No. 1

issue 3 dated 21st September, 1956

of Specification Valve Electronic CV.4007

Page 2

Near centre of page, under heading of GROUP D:-

Amend The capacitance figure in Limits Max. column as below.

Against Ck', a' + h + s + External Screen

Amend "4.7 pF max" to "5.0 pF max".

Against Ck", a" + h + s + External Screen

Amend "4.7 pF max" to "5.0 pF max".

T.V.C. for R.R.E.

May, 1958
N.25474R

ELECTRONIC VALVE SPECIFICATIONS

SPECIFICATION CV.4009

ISSUE 2. DATED 6.4.56.

AMENDMENT No. 2.

GROUP E. POST FATIGUE AND POST SHOCK TESTS.

VIBRATION NOISE.

Amend the maximum limit of 150 mV. (inserted by Amendment No.1) to read 450 mV.

GROUP F. STABILITY LIFE (1 hour).

CHANGE IN MUTUAL CONDUCTANCE.

Amend the maximum limit to read 10% from 5%.

INTERMITTENT LIFE. TEST POINT (500 hours).

ELECTRODE INSULATION.

Amend the existing test to read as follows:

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min	LAL	Bogey	UAL	Max.	ALD	
	Electrode Insulation	Vh = 6.3v. Note 8.	4.0									
		Vg1 - all = -100v.			R	50	-	-	-	-	-	MΩ
		Vg2 - all = -300v.			R	50	-	-	-	-	-	MΩ
		Va - all = -300v.			R	50	-	-	-	-	-	MΩ

TEST POINT (1000 hours).

HEATER CURRENT.

Delete all reference to this test.

At the end of this group add the following test:

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min	LAL	Bogey	UAL	Max.	ALD	
	Electrode Insulation	Vh = 6.3v. Note 8.	6.5									
		Vg1 - all = -100v.			R	30	-	-	-	-	-	MΩ
		Vg2 - all = -300v.			R	30	-	-	-	-	-	MΩ
		Va - all = -300v.			R	30	-	-	-	-	-	MΩ

RAE

Director,
Royal Aircraft Establishment.